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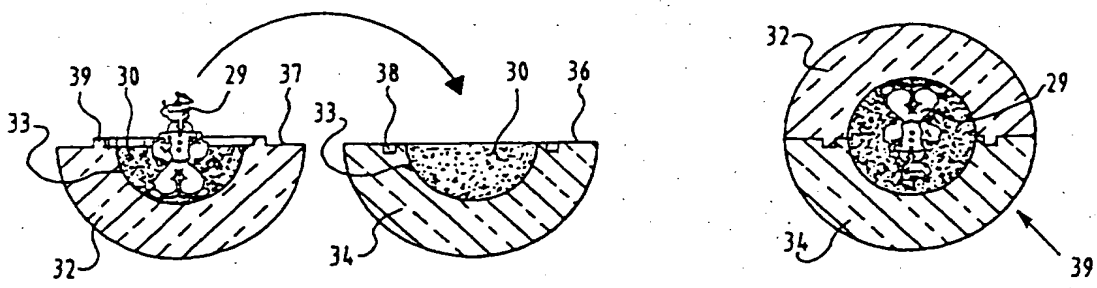
(54) Title: METHOD FOR ENCLOSING AN OBJECT WITH A TRANSPARENT ENCAPSULATION



(57) Abstract

A method for enclosing an object (29) with a spherical, transparent encapsulation (32, 34) of glass or like hard and scratch-resistant material comprises the following steps, to be performed in suitable sequence, of: (a) providing the object (29); (b) arranging this object (29) in a cavity (33); (c) pouring a plastic curable mass (30) round this object (29); (d) causing this mass (30) to cure to a transparent encapsulating mass; (e) as desired: either (e1) immediately encapsulating the object with glass, wherein said cavity is a mould cavity corresponding with the desired spherical form; or (e2) embedding the object in a plastic which is transparent at least in cured state, wherein said cavity is recessed into the pre-manufactured, glass, part-spherical encapsulation.

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Method for enclosing an object with a transparent encapsulation

Transparent glass marbles are known in which is arranged a three-dimensional coloured structure visible from the outside. This structure itself consists of glass. During manufacture of such a marble use is made of the common melting range of the three-dimensional structure and the transparent glass encapsulation to obtain a transparent moulded article of the described type.

The invention has for its object to provide a method with which an object of practically any desired nature, composition and form can be incorporated in a spherical transparent encapsulation.

In this respect the invention provides a method for enclosing an object with a spherical, transparent encapsulation of glass or like hard and scratch-resistant material, comprising the following steps, to be performed in suitable sequence, of:

(a) providing the object;

(b) arranging this object in a cavity;

(c) pouring a plastic curable mass round this object;

(d) causing this mass to cure to a transparent encapsulating mass;

(e) as desired:

- either (e1) immediately encapsulating the object with glass, wherein said cavity is a mould cavity corresponding with the desired spherical form;

- or (e2) embedding the object in a plastic which is transparent at least in cured state, wherein said cavity is recessed into the pre-manufactured, glass, part-spherical encapsulation.

It is noted that the melting temperature of glass lies in the order of magnitude of 600-800°C. Glass

is normally processed in plastic state at a temperature in the order of 1200°C. In the case aspect (e1) is applied the object enclosed by the glass mass must have a higher degradation temperature.

This latter can be achieved easily with an embodiment wherein step (a) is performed with an object of ceramic material, which can optionally be at least partly covered with an optionally coloured coating, for instance of enamel or glazing.

An alternative has the special feature that step (a) is performed with an object of metal which can optionally be at least partly covered with an optionally coloured coating, for instance of enamel or glazing.

Very inexpensive, simple and practical to perform on a large scale is the method wherein step (a) is performed with an object of aluminium which is optionally anodized in one or more colours.

The obtained products are transparent spheres which have at least a glass jacket. These spheres can particularly have dimensions such that they are suitable as children's toys, particularly for use as marbles.

As already noted above, the use of glass for instance for marbles is per se known. Glass has the great advantage of being a hard and therefore scratch-resistant material, whereby the spherical moulded articles are mechanically not very vulnerable.

Another method as described above for wholly enclosing an object with a spherical, glass, transparant encapsulation comprises the following steps:

(f) providing an object which has a degradation temperature, for instance the temperature at which at least a part of the object substantially softens, melts or otherwise degenerates in possibly reversible manner;

(g) arranging the object in a spherical mould cavity, the shape of which corresponds with the desired spherical shape of the encapsulation;

(h) providing a transparent encapsulating material which melts at a melting temperature lower than said degradation temperature;

(i) causing the encapsulating material to melt by heating and carrying thereof into the mould cavity;

(j) causing the encapsulating material to cool to below the melting temperature; and

(k) opening the mould cavity and removing the solidified spherical moulded article.

A specific embodiment has the special feature that prior to step (i) the object is carried by a support consisting of a transparent material which melts at a melting temperature lower than said degeneration temperature and which can fuse substantially homogeneously with the encapsulating material during step (i).

This method can be performed in particular such that the support consists of glass.

In principle the use of a support can be dispensed with in a method wherein after step (k) the solidified encapsulation with the object incorporated therein is subjected as a whole to the steps (f), (g), (i), (j), (k), wherein step (h) is replaced by:

(l) providing the same encapsulating material as in step (h) such that a larger encapsulation is obtained.

In this latter embodiment the object is supported for instance by the wall of the mould cavity, is subsequently enclosed by encapsulating material, whereafter the encapsulation with the object is taken out after cooling and is processed once again as a whole as if it were an object for encapsulating. The difference with the object for encapsulating is that the encapsulation is meltable at a relatively low temperature and it must therefore be ensured that not the whole mass of solidified encapsulating material melts. In this manner an additional encapsulating jacket can be arranged, whereby the object can be positioned at a

desired distance from the outer surface of the encapsulation.

The variant according to aspect (e2) has the advantage that the relevant method can take place at relatively low temperature, in certain conditions even at room temperature. This considerably simplifies manufacture of the moulded articles. Use can be made of a plastic mass curing at low temperature, for instance on a two-component basis. One prerequisite is that the plastic is transparent in cured state.

A specific variant has the special feature that the object is embedded in a plastic plastic poured into the said cavity in the glass, part-spherical encapsulation and the mould cavity is thereafter covered by a glass cover which completes the spherical shape of said part-spherical encapsulation. This method is important because for optimum scratch-resistance the whole outer surface of the spherical moulded article must consist of glass.

The embodiment is recommended in which step (e2) is performed with a plastic which in cured state has substantially the same refractive index as the glass of the encapsulation. With this choice transitions between glass and plastic are not optically detectable. It will be apparent that it is assumed in this case that both materials are completely colourless or have the same colour.

Yet another variant has the special feature that at least one boundary surface between the glass encapsulation and the cover carries information.

In order to obtain invisible contact surfaces the method is recommended in which the cover is adhered to the encapsulation by a glue which in cured state has substantially the same refractive index as the glass of the encapsulation.

A method which can be carried out very simply and quickly is that in which said plastic is the glue and the cover is placed prior to curing of the plastic.

When plastic is used as embedding material the method according to the invention can advantageously be carried out such that the object is provided in advance at least partially with an optionally coloured coating, which coating corresponds chemically or is at least compatible with the plastic. The coating can for instance dissolve momentarily in the still plastic embedding mass. This affinity between the two materials ensures an attractive appearance.

It is further noted generally that the method according to the invention must be performed under all conditions such that the product meets required aesthetic standards. Inclusions, for instance air bubbles, must particularly be avoided.

Finally, the invention relates to a spherical product obtained with a method according to the invention. This product consists of an object enclosed with a glass encapsulation.

The encapsulation itself can be without colour or coloured. In this respect the term "transparent" must therefore not be specifically understood to mean a non-coloured mass.

An object can for instance comprise a three-dimensional representation of one or more comic or cartoon figures. This can be very attractive, particularly when the products according to the invention are used as children's toys.

The invention will now be elucidated with reference to the annexed drawings. Herein:

figure 1 shows a partly broken-away, schematic side view of a device for performing the method according to the invention;

figure 2 shows a side view of a spherical marble according to the invention which is manufactured with the device of figure 1;

figures 3a, 3b, 3c and 3d show schematically in cross section respective stages progressed through in a specific method according to the invention; and

figures 4a, 4b and 4c show views corresponding with figure 3 of another embodiment.

Figure 1 shows a device 1 comprising an endless conveyor belt 2 which has blind holes 3 on its outer surface, into which fit glass stems 4. These stems 4 each carry a platform 5. A feed device 6 successively places one glass stem 4 bearing a platform 5 at a time into a blind hole 3 at the beginning of the active part of conveyor belt 2. A clay supply station 7 successively feeds a mass of clay 12 to the platforms 5 present thereunder via four nozzles 8, 9, 10, 11. In a moulding station 13 the clay masses 12 are formed into the desired shape. In the station 14 the formed clay masses are heated and provided with colour glazing in various colours. In a subsequent heating station 15 a heating takes place to high temperatures such that the clay hardens to a ceramic mass and the glaze coating can dry and harden.

In a subsequent encapsulating station 16 preheated, molten glass 17 is supplied via nozzles 18 to spherical mould cavities 19, which are closed after the pre-baked and coloured ceramic objects 20 are placed in the respective mould cavities, still carried by the glass stems 4. Through the thermal contact of the mass 17 of molten glass with the glass platforms 5, these platforms also melt to become an integral part of the moulded glass encapsulation.

After cooling of the glass mass to below the melting temperature, the spherical moulded articles are ready, the mould 21 with the mould cavities can be opened and the moulded articles 22 can be removed for further transport and to be packed for dispatching.

The remaining parts of the glass stems 4 still present at the end of the active part of the conveyor belt 2 fall out of the blind holes 3 under the influence of the force of gravity and are collected in a collection tank 24. The material is suitable for re-use.

Figure 2 shows on enlarged scale a moulded article or product 22 according to the invention. The ceramic object 20 is completely embedded in a spherical mass 23 of transparent glass.

It is pointed out emphatically that the device according to figure 1 is only intended to show which process steps could be used to implement the method according to the invention in order to obtain the product according to the invention. In order to show the process sequence the entire process is represented as if it can be carried out by successive stations along one endless conveyor belt. In practice it will not be possible to make use of one conveyor belt in connection with the different necessary treatment times in the different stations. In particular the pre-heating in station 14 and heating in station 15 are steps requiring quite a considerable period of time.

A spherical outer surface of the transparent encapsulation not only has the advantage of a regular optical image of the embedded object in contrast to for instance a regular polyhedron, the structure of the outer surface of a football, or the like, but also that an embedded object can be optically enlarged in substantially homogeneous manner. The embedded object can hereby be comparatively small.

Figure 3a shows a glass object 25 with a part-spherical form. The object could be described as a glass sphere into which a blind cavity 26 has been recessed. In this embodiment the cavity 26 has a shape tapering slightly toward its bottom 27. This tapering form facilitates release of the object 25 from the mould cavity. Situated at the top of cavity 26 is a step-like widening 28, the purpose of which will be explained hereinbelow.

Figure 3b shows that an object in the form of a cartoon figure 29 is placed in cavity 26 and is embedded in a liquid two-component plastic embedding mass 30. This mass is introduced in a quantity such that the lower edge

31 of step 28 is situated just below the liquid surface. In the step 28 is then placed a glass cover 31 which fits precisely in the step 28. As shown in figure 3c, the outer surface of cover 31 has a shape corresponding with the spherical form of object 25 and complementary thereto. Due to the slight overmeasure of plastic in cavity 26 the plastic is able to adhere to the contact surfaces between step 28 and cover 31. A possible excess of plastic can easily be removed from the outside before the plastic has cured. Figure 3d shows the finished object.

The plastic 30 is of a type having the same refractive index as the glass of object 25 and cover 31. The surfaces drawn in figure 3d with full lines are thereby wholly invisible.

Figure 4a shows an embodiment wherein an object 32 takes the general form of a hemisphere with a spherical internal cavity 33 in which the figure 29 is already placed such that it is situated partly in the plastic mass 30 but protrudes upward therefrom with a certain part. After curing of the plastic 30 a complementary hemispherical object 34 is prepared by pouring plastic 30 into mould cavity 33. The finished object 32 is then placed on object 34 as according to arrow 35 whereby the upper part of figure 29 is immersed in the still liquid plastic 30. Use can for instance also be made in this case of a certain overmeasure of plastic whereby this plastic, which also serves as glue, is pressed outward through the gap between the flat end surfaces 36, 37 of the objects 34, 32. The objects 32, 34 are positioned exactly by respectively the peripheral groove 38 and the annular protrusion 39 having a shape complementary thereto such that the objects can together form a spherical shape, as drawn in figure 4c.

Attention is drawn to the fact that for instance one of the surfaces 36, 37 can carry information, for instance a number. Accordingly, the objects in question can be collected and it can be easily

determined that for instance a series for purchase is wholly complete.

Figure 4c shows the spherical completed object 39. It is noted that due to the magnifying effect of the glass encapsulation 32, 34 the figure 29 is perceived in greatly magnified manner from the outside.

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Claims

1. Method for enclosing an object with a spherical, transparent encapsulation of glass or like hard and scratch-resistant material, comprising the following steps, to be performed in suitable sequence, of:

(a) providing the object;

(b) arranging this object in a cavity;

(c) pouring a plastic curable mass round this object;

(d) causing this mass to cure to a transparent encapsulating mass;

(e) as desired:

- either (e1) immediately encapsulating the object with glass, wherein said cavity is a mould cavity corresponding with the desired spherical form;

- or (e2) embedding the object in a plastic which is transparent at least in cured state, wherein said cavity is recessed into the pre-manufactured, glass, part-spherical encapsulation.

2. Method as claimed in claim 1 for wholly enclosing an object with a spherical, glass transparent encapsulation, comprising the following steps, to be performed in suitable sequence, of:

(f) providing an object which has a degradation temperature, for instance the temperature at which at least a part of the object substantially softens, melts or otherwise degenerates in possibly reversible manner;

(g) arranging the object in a spherical mould cavity, the shape of which corresponds with the desired spherical shape of the encapsulation;

(h) providing a transparent encapsulating material which melts at a melting temperature lower than said degradation temperature;

(i) causing the encapsulating material to melt by heating and carrying thereof into the mould cavity;

(j) causing the encapsulating material to cool to below the melting temperature; and

(k) opening the mould cavity and removing the solidified spherical moulded article.

3. Method as claimed in claim 2, wherein prior to step (i) the object is carried by a support consisting of a transparent material which melts at a melting temperature lower than said degeneration temperature and which can fuse substantially homogeneously with the encapsulating material during step (i).

4. Method as claimed in claim 3, wherein the support consists of glass.

5. Method as claimed in claim 2, wherein after step (k) the solidified encapsulation with the object incorporated therein is subjected as a whole to the steps (f), (g), (i), (j), (k), wherein step (h) is replaced by:

(l) providing the same encapsulating material as in step (h) such that a larger encapsulation is obtained.

6. Method as claimed in claim 2, wherein step (f) is performed with an object of ceramic material which can optionally be at least partly covered with an optionally coloured coating, for instance of enamel or glazing.

7. Method as claimed in claim 2, wherein step (f) is performed with an object of metal, which can optionally be at least partly covered with an optionally coloured coating, for instance of enamel or glazing.

8. Method as claimed in claim 7, wherein step (f) is performed with an object of aluminium optionally anodized in one or more colours.

9. Method as claimed in claim 1, wherein the object is embedded in a plastic plastic poured into the said cavity in the glass, part-spherical encapsulation and the mould cavity is thereafter covered by a glass cover which completes the spherical shape of said part-

spherical encapsulation to obtain the spherical encapsulation.

10. Method as claimed in claim 1, wherein step (e2) is performed with a plastic which in cured state has substantially the same refractive index as the glass of the encapsulation.

11. Method as claimed in claim 9, wherein at least one boundary surface between the glass encapsulation and the cover carries information.

12. Method as claimed in claim 9, wherein the cover is adhered to the encapsulation by a glue which in cured state has substantially the same refractive index as the glass of the encapsulation.

13. Method as claimed in claim 12, wherein said plastic is also the glue and the cover is placed prior to curing of the plastic.

14. Method as claimed in claim 9, wherein the object is provided in advance at least partially with an optionally coloured coating, which coating corresponds chemically or is at least compatible with the plastic.

15. Spherical product obtained with a method as claimed in any of the foregoing claims, which product consists of an object enclosed with a glass encapsulation.

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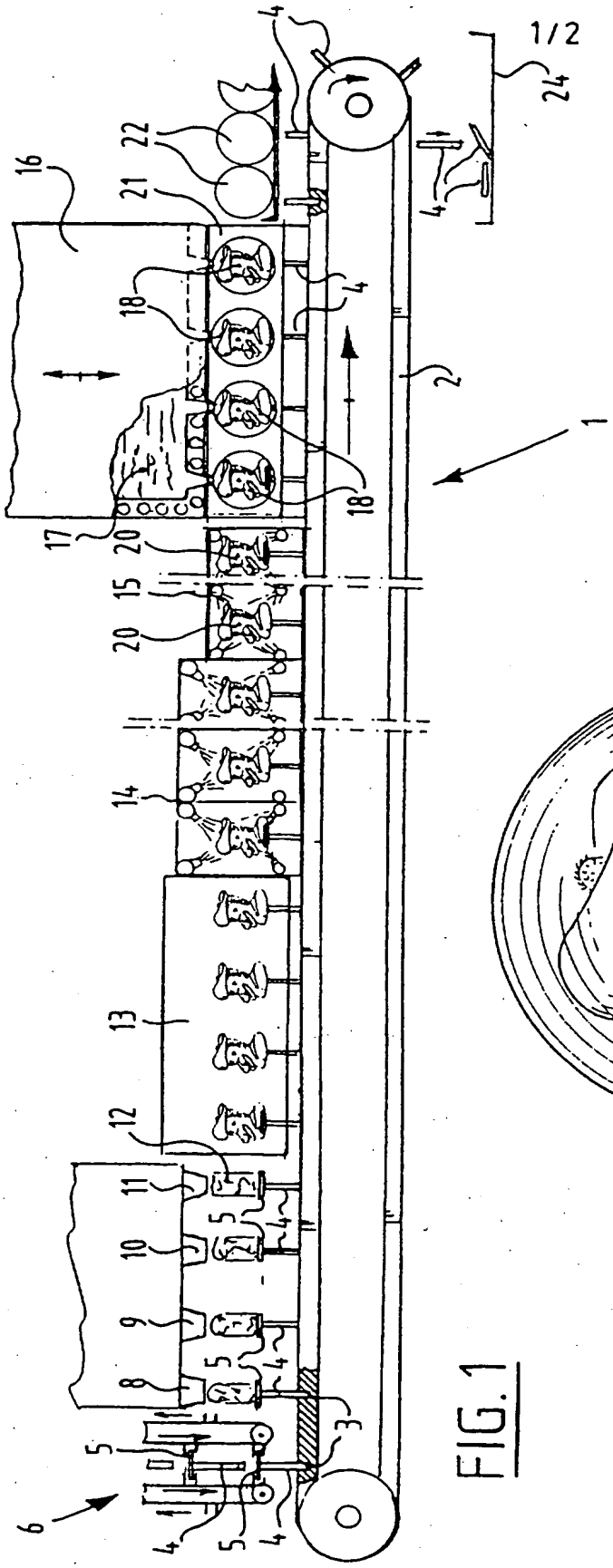

FIG. 1

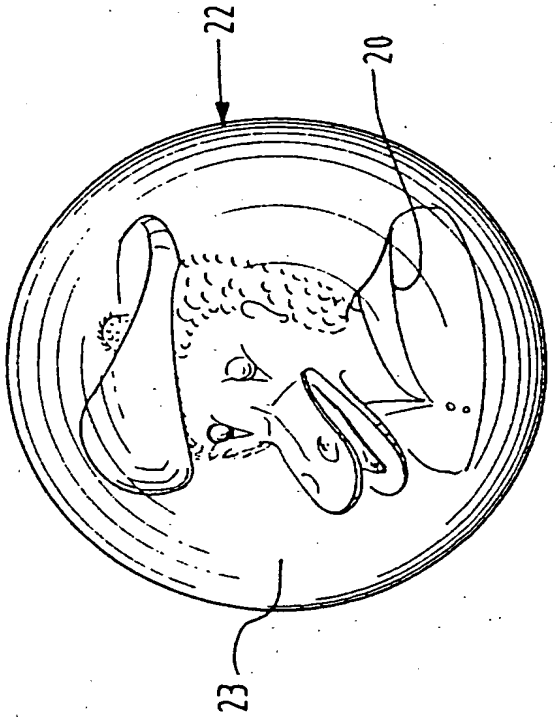

FIG. 2

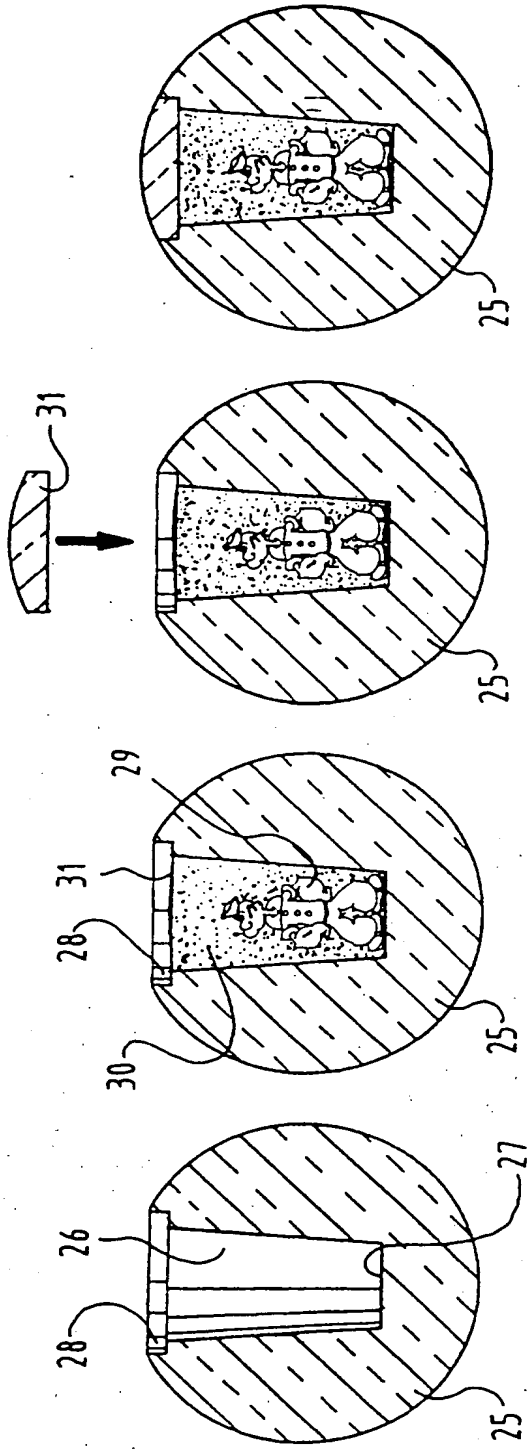

FIG. 3a

FIG. 3b

FIG. 3c

FIG. 3d

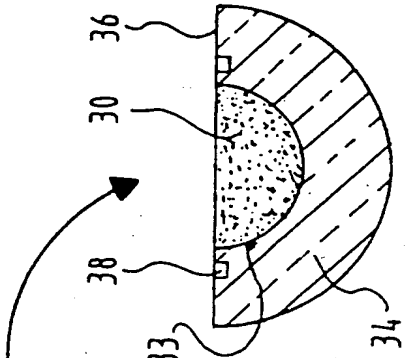

FIG. 4b

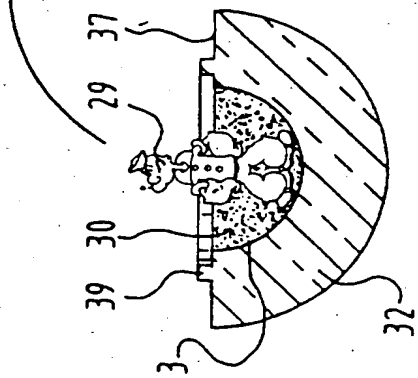

FIG. 4a

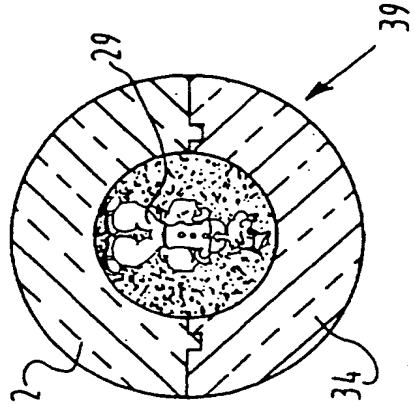

FIG. 4c

INTERNATIONAL SEARCH REPORT

Internat Application No
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A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 C03B19/02 B44C5/00 G09F23/00

According to International Patent Classification (IPC) or to both national classification and IPC

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Minimum documentation searched (classification system followed by classification symbols)
IPC 6 C03B B44C G09F B29C B22D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2 073 254 A (REDMAN) 9 March 1937 see the whole document ---	1,15
A	US 2 350 421 A (SCHODER) 6 June 1944 see the whole document ---	1,15
A	FR 1 178 558 A (FREBAULT) 12 May 1959 see the whole document ---	1,15
A	US 3 254 979 A (KNAPP) 7 June 1966 see the whole document ---	1,15
A	US 3 489 545 A (LE CLERC DE BUSSY) 13 January 1970 see the whole document ---	1,15
A	US 3 463 624 A (LABINO) 26 August 1969 see the whole document ---	1,15
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[X] Patent family members are listed in annex.

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INTERNATIONAL SEARCH REPORT

Internat Application No
PCT/NL 97/00010

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	DE 37 26 022 A (INSTITUT FÜR TECHNISCHE INNOVATION GMBH) 16 February 1989 see the whole document	1,15
A	US 1 879 816 A (KRIEG) 27 September 1932 see the whole document	1,15
A	US 1 880 118 A (ALLYN) 27 September 1932 see the whole document	1,15
X	US 4 067 947 A (MIORI) 10 January 1978 see the whole document	1,9,15
X	FR 2 683 183 A (SEXTANT AVIONIQUE) 7 May 1993 see the whole document	1,9,15
X	US 4 278 626 A (ATANASOVSKI) 14 July 1981 see the whole document	1,9,15
X	DE 89 05 796 U (KORZILIUS SÖHNE GMBH) 24 August 1989 see the whole document	1,9,15
X	US 4 643 693 A (RUBINSTEIN) 17 February 1987 see the whole document	1,9,15
X	WO 90 11481 A (HOBELSBERGER) 4 October 1990 see the whole document	1,9,15
X	FR 2 324 470 A (PAULEY) 15 April 1977 see the whole document	1,9,15
A	US 4 584 212 A (KLEIN) 22 April 1986 see the whole document	1,9,15
X	FR 1 178 558 A (FREBAULT) 12 May 1959 see the whole document	1-15

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INTERNATIONAL SEARCH REPORT

Information on patent family members

Internat Application No
PCT/NL 97/00010

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2073254 A	09-03-37	NONE	
US 2350421 A	06-06-44	NONE	
FR 1178558 A	12-05-59	NONE	
US 3254979 A	07-06-66	NONE	
US 3489545 A	13-01-70	BE 716878 A DE 1771767 A GB 1203678 A	02-12-68 05-01-72 03-09-70
US 3463624 A	26-08-69	NONE	
DE 3726022 A	16-02-89	NONE	
US 1879816 A	27-09-32	NONE	
US 1880118 A	27-09-32	NONE	
US 4067947 A	10-01-78	NONE	
FR 2683183 A	07-05-93	NONE	
US 4278626 A	14-07-81	NONE	
DE 8905796 U	13-07-89	NONE	
US 4643693 A	17-02-87	NONE	
WO 9011481 A	04-10-90	DE 3909318 A	27-09-90
FR 2324470 A	15-04-77	CA 1095716 A GB 1561363 A AU 502547 B AU 1814776 A	17-02-81 20-02-80 02-08-79 06-04-78
US 4584212 A	22-04-86	NONE	
FR 1178558 A	12-05-59	NONE	